

1 SELF ADJUSTING GROOVED PLIERS

2  
3 CROSS-REFERENCE TO RELATED APPLICATION

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5 This application claims the benefit of U.S. Provisional  
6 Patent Application No. 60/400,545, filed 01 August 2002.

7  
8 FIELD OF THE INVENTION

9  
10 This invention relates to hand tools.

11  
12 More particularly, the present invention relates to  
13 grooved pliers.

14  
15 In a further and more specific aspect, the instant  
16 invention concerns grooved pliers which are self adjusting.

17  
18 BACKGROUND OF THE INVENTION

19  
20 Pliers having jaws which are adjustable between various  
21 positions are well known in the art. Typically, these types of  
22 pliers include two halves each having a jaw portion the halves  
23 are coupled at a pivot by a bolt or rivet. One half includes a  
24 channel allowing the pivot to be adjusted by moving the bolt or  
25 rivet therealong for a wider or narrower association between  
26 the jaw portions of the halves. The conventional grooved  
27 pliers include a plurality of grooves formed in one half

1 proximate the channel for receiving a tongue formed on the  
2 other half. The adjustment is accomplished by opening the  
3 pliers fully so that the tongue leaves the grooves, and sliding  
4 the two halves until the tongue on one section aligns with the  
5 desired groove on the other section. When the conventional  
6 pliers are closed a slight amount, the tongue enters the groove  
7 and is locked into that adjustment, preventing movement of the  
8 pivot in the channel until the sections are fully opened again.  
9 This adjustment requires the use of two hands, and careful  
10 alignment of the tongue with the desired groove, or the pliers  
11 will not close. More importantly, when in use if the pliers  
12 are at the wrong adjustment, the pliers must be removed and  
13 readjusted.

14

15 It would be highly advantageous, therefore, to remedy the  
16 foregoing and other deficiencies inherent in the prior art.

17

18 Accordingly, it is an object of the present invention to  
19 provide new and improved adjustable grooved pliers.

20

21 It is another object of the present invention to provide  
22 adjustable grooved pliers which are self adjusting.

23

24 Another object of the present invention is to provide  
25 grooved pliers which can be adjusted with one hand.

1        Yet another object of the present invention is to provide  
2 adjustable grooved pliers which can be adjusted while engaging  
3 an object.

## SUMMARY OF THE INVENTION

Briefly, to achieve the desired objects of the instant invention in accordance with a preferred embodiment thereof, provided are self adjusting grooved pliers include a first section having a jaw portion and a channel formed therethrough adjacent the jaw portion and a second section having a jaw portion and a pivot extending therefrom. The pivot is slidably received in the channel to allow wider or narrower association between the jaw portion of the first section and the jaw portion of the second section. The pivot pivotally couples the first section to the second section for movement between an open position and a gripping position. A plurality of grooves is formed in the first section and a tongue extends from the second section. The tongue is received in one of the plurality of grooves, locking the pivot in position within the channel only upon the first section and the second section reaching the gripping position. A biasing assembly acts on the pivot, urging the pivot upward in the channel toward the jaw portion of the first section.

In another aspect of the present invention, the biasing assembly includes a coil spring fitted into a handle portion of the first section and an extension member having an end engaging the coil spring and an opposing end extending into the channel and engaging the pivot. The coil spring and the

1 extension cooperate to urge the pivot in the channel toward the  
2 first jaw portion.

3  
4 In another aspect, the biasing assembly includes a post  
5 extending from the pivot into a receptacle extending from the  
6 first section and a coil spring carried by the post within the  
7 receptacle. The compression spring is compressed between the  
8 pivot and the receptacle.

9  
10 In yet another aspect, the second jaw portion of the  
11 second section is carried by a jaw element pivotally coupled to  
12 the second section. The jaw element is movable between a start  
13 position and a finish position, and is biased into the start  
14 position by a biasing member.

#### 15 16 17 BRIEF DESCRIPTION OF THE DRAWINGS 18

19 The foregoing and further and more specific objects and  
20 advantages of the instant invention will become readily  
21 apparent to those skilled in the art from the following  
22 detailed description of a preferred embodiment thereof taken in  
23 conjunction with the drawings, in which:

24  
25 FIG. 1 is a plan view of self adjusting grooved pliers  
26 according to the present invention;

FIG. 2 is a disassembled plan view of the pliers of FIG. 1;

FIG. 3 is an enlarged view of the interaction of the tongue and grooves of the pliers of FIGS. 1 and 2;

FIG. 4 is an enlarged perspective view of a portion of the biasing mechanism;

FIG. 5 is a plan view of self adjusting grooved pliers according to the present invention, illustrating another embodiment of a biasing mechanism;

FIG. 6 is a plan view of self adjusting grooved pliers according to the present invention, illustrating yet another embodiment of a biasing mechanism;

FIG. 7 is a plan view of another embodiment of self adjusting grooved pliers according to the present invention;

FIG. 8 is an enlarged exploded perspective view of a section of the pliers of FIG. 7;

FIG. 9 is a plan view of the pliers of FIGS. 7 and 8 as it appears in the adjusting orientation;

1        FIG. 10 is a plan view of the pliers of FIGS. 7 and 8 as  
2 it appears in the locked orientation;

3

4        FIG. 11 is a plan view of yet another embodiment of self  
5 adjusting grooved pliers according to the present invention;

6

7        FIG. 12 is a plan view of a section of the pliers of FIG.  
8 11 showing double tongues; and

9

10       FIG. 13 is a plan view of a section of the pliers of FIG.  
11 11 showing double grooves.

1                    DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

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3            Turning now to the drawings in which like reference

4 characters indicate corresponding elements throughout the

5 several views, attention is first directed to FIG. 1 which

6 illustrates self adjusting grooved pliers generally designated

7 10. Pliers 10 are similar to conventional grooved pliers with

8 the exception that modifications have been made to the grooves

9 and tongues, as will be described presently, and a biasing

10 mechanism has been added, which while advantageous, is not

11 required. Pliers 10 include a section 12 having a jaw portion

12 13 and a section 14 having a jaw portion 15, coupled at a pivot

13 16. Section 12 includes a channel 18 adjacent jaw portion 13,

14 which receives pivot 16, allowing pivot 16 between sections 12

15 and 14, to be adjusted for a wider or narrower association

16 between jaw portions 13 and 15. section 12 and section 14

17 pivot about pivot 16 moving jaw portions 14 and 15 between an

18 open position and a gripping position.

19

20            Conventional grooved pliers include a plurality of grooves

21 formed in one section proximate the channel for receiving a

22 tongue formed on the other section. The adjustment is

23 accomplished by opening the pliers fully so that the tongue

24 leaves the grooves, and sliding the two sections until the

25 tongue on one section aligns with the desired groove on the

26 other section. When the conventional pliers are closed a

27 slight amount, the tongue enters the groove and is locked into



1 that adjustment, preventing movement of the pivot in the  
2 channel until the sections are fully opened again.

3

4 Pliers 10 of the present invention, includes grooves 20  
5 formed in section 12 proximate channel 18 for receiving a  
6 tongue 22 formed on section 14. Tongue 22 is shortened to a  
7 tooth or nub when compared to existing grooved pliers tongues.  
8 Additionally, the positioning of tongue 22 is such that it  
9 enters one of grooves 20 slightly before or when jaws 13 and 15  
10 come to a substantially parallel position with respect to one  
11 another. It will be understood by one skilled in the art that  
12 while tongue 22 is shortened in this preferred embodiment, it  
13 may be positioned in a radial position with respect to pivot 16  
14 that the same effect occurs. By positioning tongue 22 in this  
15 manner, pliers 10 become self adjusting. Closing jaws 13 and  
16 15 about an item to be engaged allows pivot 16 to travel along  
17 channel 18 until jaws 13 and 15 are substantially parallel (a  
18 preferred gripping position), at which point tongue 22 enter  
19 one of grooves 20, locking sections 12 and 14 in position and  
20 allowing the application of a clamping force to jaws 13 and 15.  
21 One skilled in the art will readily understand that while the  
22 preferred gripping position is when jaws 13 and 15 are  
23 parallel, or within a few degrees thereof, other gripping  
24 position can be employed. For example the gripping position  
25 can diverge from parallel by a few degrees or by many degrees  
26 as desired, as long as the gripping position is less than a  
27 fully open position.

1        With additional reference to FIG. 4, a biasing assembly  
2        can be included which acts on pivot 16, urging it upward in  
3        channel 18, toward jaw 13 and into the smallest adjustment  
4        distance between jaws 13 and 15. In this embodiment, the  
5        biasing assembly includes a coil spring 24 fitted into a handle  
6        portion 25 of section 12 and an extension member 26. Extension  
7        member 26 is preferably formed of a spring material such as  
8        steel or plastic and has an end 28 engaging coil spring 24 and  
9        an opposing end 29 extending into channel 18 and engaging pivot  
10       16. Coil spring 24 and extension cooperate to urge pivot 16 in  
11       channel 18 toward jaw 13. Thus when in use, jaws 13 and 15 are  
12       in the closest or smallest setting. Upon closing pliers 10,  
13       tongue 22 enters the first of grooves 20 designated 20a. Since  
14       the ideal gripping position of jaws 13 and 15 are when they are  
15       parallel, it is desirable that jaws 13 and 15 be spread apart a  
16       greater distance for larger items. When a larger item is  
17       clamped, the jaws are opened sufficiently to engage  
18       substantially opposing sides thereof. As the jaws are drawn  
19       together by the closing of section 12 and 14, pivot 16 slides  
20       back in channel 18 away from jaw 13 against the bias, until  
21       jaws 13 and 15 are substantially parallel or slightly before.  
22       At this point, by the positioning of tongue 22, tongue 22  
23       enters an aligned one of grooves 20, locking sections 12 and 14  
24       into position and permitting a clamping force to be applied by  
25       jaws 13 and 15 to the item being clamped. When pliers 10 is  
26       removed from engagement with the item clamped, the biasing  
27       assembly urges pivot upward in channel 18 with jaws 13 and 15

1 in the closest or smallest adjustment prior to the next  
2 clamping operation.

3

4 Still referring to FIGS. 1 and 2, with additional  
5 reference to FIG. 3, grooves 20 are formed by a plurality of  
6 raised ridges 30 each having a leading edge 32 and a slanted  
7 leading face 33 slanting back therefrom. Tongue 22 also has a  
8 leading edge 35 and a slanted leading face 36 slanting back  
9 therefrom. Leading faces 32 and 34 act in concert as a  
10 centering mechanism. When leading edge 35 engages slanted  
11 leading face 33, tongue 22 is guided into the adjacent lower  
12 groove. When leading edge 33 of tongue 22 engages slanted  
13 leading face 36, tongue 22 is guided into an upper adjacent  
14 groove. In this manner, pliers 10 will always close smoothly  
15 without the need to manually align tongue 22 with one of  
16 grooves 20.

17

18 Turning now to FIG. 5, another embodiment of a pair of  
19 pliers generally designated 40 is illustrated. Pliers 40 are  
20 substantially similar to pliers 10, including a section 42  
21 having a channel therein, a section 43 and a pivot 44. A  
22 slight modification has been made to the biasing assembly. In  
23 this embodiment, the biasing assembly includes a post 45  
24 extending from pivot 44 into a receptacle 46 extending from  
25 section 42. Post 45 is carried within a coil spring 47 which  
26 is compressed between pivot 44 and receptacle 46. Turning to  
27 FIG. 6, a receptacle 46 is illustrated with an open end.

1 Referring now to FIGS. 7 and 8, another embodiment of a  
2 self adjusting grooved pliers generally designated 50, is  
3 illustrated. Pliers 50 are similar to pliers 10, including a  
4 section 52 having a jaw portion 53 and a section 54 having a  
5 jaw portion 55, pivotally coupled at a pivot 56. Section 52  
6 includes a channel 58 adjacent jaw portion 53, allowing pivot  
7 56 between sections 52 and 54 to be adjusted for a wider or  
8 narrower association between jaw portions 53 and 55. Grooves  
9 60 are formed in section 52 proximate channel 58 for receiving  
10 a tongue 62 formed on section 54. Tongue 62 is positioned such  
11 that it enters one of grooves 60 slightly before or when jaws  
12 53 and 55 come to a substantially parallel position with  
13 respect to one another. The difference, in this embodiment, is  
14 the construction of section 54. Section 54 includes jaw  
15 portion 55 carried by a jaw element 64 pivotally coupled to  
16 section 54 between a start position and a finish position. The  
17 movement of jaw element 64 is biased into the start position by  
18 a spring 65.

19  
20 Referring now to FIGS. 9 and 10, the pivotal movement of  
21 jaw element 64 provides more distance of travel of sections 52  
22 and 54 after jaws 53 and 55 become parallel. Thus, as an  
23 object is being engaged, as shown in FIG. 9, pivot 56 moves  
24 downward. When the object is engaged, and jaws 53 and 55 are  
25 substantially parallel, tongue 62 enters one of grooves 60 and  
26 prevents further movement of pivot 56 within channel 58.  
27 Continued pressure on sections 52 and 54 causes jaw element 64

1 to pivot toward the finish position. In actual operation, jaw  
2 element 64 remains stationary relative the object being  
3 clamped, and section 54 continues rotation as illustrated by  
4 arrowed arc A until jaw element 64 reaches the finish position.  
5 By having section 54 continue rotation, tongue 62 is received  
6 further into the one of grooves 60. This provides a stronger  
7 and more secure engagement for the application of clamping  
8 force to pliers 50.

9

10 Referring to FIGS. 11, 12 and 13, yet another embodiment  
11 of a self adjusting grooved pliers generally designated 80, is  
12 illustrated. Pliers 80 are similar to pliers 50, including a  
13 section 82 having a jaw portion 83 and a section 84 having a  
14 jaw portion 85, pivotally coupled at a pivot 86. Section 82  
15 includes a channel 88 adjacent jaw portion 83, allowing pivot  
16 86 between sections 82 and 84 to be adjusted for a wider or  
17 narrower association between jaw portions 83 and 85. In this  
18 embodiment, two sets of grooves 90A and 90B are formed in  
19 section 52 proximate a leading side top portion of channel 58  
20 and a trailing side bottom portion thereof respectively, for  
21 receiving a tongue 92A and a tongue 92B formed on section 84 on  
22 substantially opposing sides of pivot 86. Tongues 92A and 92B  
23 are positioned such that they enter one of grooves 90A and 90B  
24 respectively slightly before or when jaws 83 and 85 come to a  
25 substantially parallel position with respect to one another.  
26 The difference, in this embodiment, is the use of a pair of  
27 tongues and a pair of grooves to provide added strength to

1 pliers 80. Additionally, section 84 can include jaw portion 85  
2 carried by a jaw element 94 pivotally coupled to section 84  
3 between a start position and a finish position. The movement  
4 of jaw element 94 is coupled in a manner as shown with pliers  
5 50. Thus, tongues 92A and 92B enter more deeply into grooves  
6 90A and 90B, providing a stronger and more reliable engagement.

7

8       Various changes and modifications to the embodiments  
9 herein chosen for purposes of illustration will readily occur  
10 to those skilled in the art. To the extent that such  
11 modifications and variations do not depart from the spirit of  
12 the invention, they are intended to be included within the  
13 scope thereof which is assessed only by a fair interpretation  
14 of the following claims.

15

16       Having fully described the invention in such clear and  
17 concise terms as to enable those skilled in the art to  
18 understand and practice the same, the invention claimed is: